Attorney Docket No. UIZ-06 U.S.S.N. 09/945,325

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1. A compound of formula I

**(I)** 

 $R_{1}$   $R_{24}$   $R_{23}$   $R_{22}$   $R_{21}$   $R_{20}$   $R_{19}$   $R_{18}$   $R_{10}$   $R_{11}$   $R_{12}$   $R_{13}$   $R_{14}$   $R_{15}$   $R_{16}$ 

wherein:

 $R_1$ - $R_4$  are independently H, alkyl, alkenyl, alkynyl, OH, NH<sub>2</sub>, SH, O- $R_6$ , N- $R_7R_8$ , or a halogen;

 $R_5$  is SH, OH, O- $R_6$ , or N- $R_7R_8$ ;

R<sub>6</sub> is H or C<sub>1</sub>-C<sub>4</sub> alkyl;

R<sub>7</sub> and R<sub>8</sub> are independently H, C<sub>1</sub>-C<sub>4</sub> alkyl, O, or S;

X is S, O, or  $N-R_9$ ;

Y is N-R<sub>9</sub>;

 $R_9$  is H, O, S, or  $C_1$ - $C_4$  alkyl;

 $R_{10}$ - $R_{13}$  are independently H,  $C_1$ - $C_4$  alkyl, OH, NH<sub>2</sub>, SH, O- $R_{25}$ , N- $R_{26}R_{27}$ , or a halogen, or  $R_{10}$  and  $R_{11}$  taken together form a carbonyl, a sulfonyl or an imino moiety, or  $R_{12}$  and  $R_{13}$  taken together form a carbonyl, a sulfonyl or an imino moiety;

R<sub>14</sub>-R<sub>24</sub> are independently H, C<sub>1</sub>-C<sub>4</sub> alkyl, OH, NH<sub>2</sub> SH, O-R<sub>25</sub>, N-R<sub>26</sub>R<sub>27</sub>, or a halogen;

 $R_{25}$  is H or  $C_1$ - $C_4$  alkyl; and

 $R_{26}$  and  $R_{27}$  are independently H,  $C_1$ - $C_4$  alkyl, O, or S; and salts thereof.

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- 3. The compound of claim 1 that is different than 2-heptyl-3-hydroxy-4-quinolone.
- 4. The compound of claim 1, wherein  $R_{16}$ ,  $R_{17}$ , and  $R_{18}$  are H.
- 5. The compound of claim 1, wherein  $R_2$  is halogen.
- 6. The compound of claim 1, wherein  $R_3$  is halogen.
- 7. The compound of claim 1, wherein  $R_4$  is halogen.
- 8. The compound of claim 1, wherein X is S or N-R<sub>9</sub>.
- 9. The compound of claim 1, wherein Y is O, S, or N-R<sub>2</sub> and wherein R<sub>2</sub> is C<sub>1</sub>-C<sub>4</sub>-alkyl.
- 10. The compound of claim 1, wherein  $R_5$  is H, SH, O- $R_6$ , or N- $R_7$ R<sub>8</sub>, and wherein  $R_6$  is C<sub>1</sub>-C<sub>4</sub> alkyl.
- 11. The compound of claim 1, wherein R<sub>5</sub> is SH, O-R<sub>6</sub>, or N-R<sub>7</sub>R<sub>8</sub>.
- 12. The compound of claim 1, wherein X is O.
- 17. The compound of claim 1, wherein the compound contains a chiral center.

18. The compound of claim 1, which is an optically active isomer.





19.

The compound of claim 1, having the formula II:

- 20. A compound of claim 1 or 19, wherein said compound is an autoinducer molecule.
- 21. The compound of claim 20, wherein said compound regulates gene expression.
- 22. The compound of claim 21, wherein said compound regulates gene expression in bacteria.
- 23. The compound of claim 22, wherein said bacteria is *Pseudomonas aeruginosa*.
- 24. The compound of claim 23, wherein said gene expresses a virulence factor.
- 25. The compound of claim 24, wherein the virulence factor is elastase.
- 26. The compound of claim 20, wherein said compound regulates the activity of the LasR protein of *Pseudomonas aeruginosa*.
- 27. The compound of claim 20, wherein said compound regulates the activity of the RhlR protein of *Pseudomonas aeruginosa*.
- 28. The compound of claim 20, wherein said compound is isolated from culture media in which *Pseudomonas aeruginosa* is grown.
- 29. A compound of claim 1, wherein said compound modulates the autoinducer activity of 2-heptyl-3-hydroxy-4-quinolone.

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32. A compound of claim 1, wherein said compound modulates the activity of the LasR and/or the RhlR proteins of *Pseudomonas aeruginosa*.



34. The compound of claim 32 that is an agonist of the LasR and/or the RhlR proteins of *Pseudomonas aeruginosa*.